Factors Associated with Human Error in Motorcycle Crashes Involving another Road User

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Abstract

The purpose of this study was to investigate factors associated with human error in motorcycle injury crashes involving another road user in Victoria, Australia. A subset of 158 motorcycle injury cases involving another road user were sourced from a larger case-control study (Day et al., 2013). Primary and secondary contributing factors were assigned based on a crash investigation, which included a rider questionnaire-based interview. The primary attribution of human error (by either the case rider or other road user) was significantly associated with four secondary or other factors: rider age, traffic density, inappropriate rider speed, or a road design issue.

Background

Motorcyclists are over-represented in road trauma statistics, due at least in part to their vulnerability in the event of a crash. Less than 1% of all vehicle kilometres travelled are by motorcycle or scooter (ABS, 2012), yet 18% of those seriously injured on Victoria roads in 2013-14 were motorcyclists (including pillions). Previous studies have reported that human error (either on the part of the rider or the other road user) is the most common primary contributor to motorcycle crashes (ACEM, 2004; Haworth et al., 1997). In the safe systems context, this indicates a failure of other elements of the road system to accommodate for human error. Therefore the purpose of this study was to identify secondary factors commonly associated with human error in multi-vehicle motorcycle crashes, based on the potential to find modifiable elements of the road system to prevent future serious injury to motorcyclists.

Methods

Eligibility and recruitment

Cases were riders of motorcycles or scooters who had recently been injured in a crash in Victoria, Australia. Recruitment was conducted between 2012 and 2014 as part of a larger case-control study (Day et al., 2013). Eligibility criteria included that the crash occurred on a public road in Victoria between 6am and midnight, and that the rider was aged 18 years or over. All procedures were approved by the ethics committees of Monash University and study hospitals where case riders were recruited.

Participants completed an interview-based questionnaire, which included questions about the events leading up to the crash, as well as contributing factors from their perspective, including the road environment, other road user(s), and themselves.

Crash investigation and assignment of contributing factors

A trained crash investigator conducted systematic investigations of the crash scene and case motorcycle. All possible contributing factors were then listed based on the crash investigation, rider

interview, and police report where available. The first author collated information from each case and coded primary and secondary contributing factors according to the ACEM (2004) definitions, in consultation with the crash investigator where necessary.

Results

Human error was judged as the primary contributing factor in 99% of motorcycle crashes involving another road userwhich was attributed to the other road user in 69% of cases. From a safe systems perspective, at least one secondary factor was judged to have either definitely or probably contributed to the crash in 72% of these cases (overall mean 1.3 ± 1.1 secondary factors).

A stepwise logistic regression was carried out to test if any secondary or other factors were associated with human error as the judged primary contributing factor (ie. other road user error vs. case rider error). Four secondary or other factors were found to be significantly associated with human error (other road user or rider) as the primary contributing factor – age, traffic density, rider inappropriate speed or a road design issue. Increasing age was associated with a decreased likelihood that an error by the case rider was the primary contributing factor. Light traffic density was associated with an error by the other road user error as the primary contributing factor, whereas heavy traffic density was associated with rider error as the primary contributing factor. Inappropriate rider speed was significantly associated with other forms of rider error as the primary contributing factor. A road design issue was significantly associated with an error by the rider as the primary contributing factor.

Conclusions

In a safe systems context, the value of understanding multiple interacting factors to crash and injury outcome must be acknowledged. Younger riders, higher traffic density, inappropriate rider speed and road design issues were all significantly associated with rider error in crashes involving another road user(s). These findings provide a greater understanding of the interaction between rider, other road user and road environment factors in real-world multi-vehicle crashes, with implications for more effective countermeasures.

References

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